Space Weather Forecast

Issued on Saturday, 22 April 2023 at 13:04 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Strong geomagnetic storm likely early Day 3 (Monday 24 April). Slight chance of R1/R2 radio blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to moderate in the UTC day of Friday 21 April, with a moderate-class X-ray flare peaking at 21/1812UTC on an otherwise quiet trace with a few Common class flares thereafter. The peak flare emanated from a large centrally-located flare and 'filament eruption' combination. A resulting Coronal Mass Ejection (CME) was clearly visible in subsequent satellite imagery. The bulk of ejecta was apparently directed south and west of the Sun-Earth line. This region was one of six on the current facing side of the Sun. All of the sunspot groups on the Earth-facing side were relatively benign and stable. Including the largest in the northwest. No further Earth directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind was Low to slightly elevated with an upward trend to 440 km/s and the number of particles in its composition was near to slight below average. The associated magnetic field was stable and at weak levels. The all-important north-south component of the field was also at weak levels, if mostly negative through the 24 hour period. The net effect of the above solar wind measures was for quiet to unsettled geomagnetic activity well below Minor Geomagnetic Storm throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed through the period, although an increase was noted after midnight UTC, with levels remaining below minor storm.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is most likely to continue at Low levels of activity with a slight chance of Moderate activity, mainly due to the largest sunspot group but perhaps also from the new region rotating onto the southeast.

Solar Wind / Geomagnetic Activity: The large full-halo CME from the 21/1812UTC Moderate class flare and filament is due to arrive at the start of the UTC day of Monday 24 April. Slightly elevated solar winds may be enhanced by a fast wind affecting Earth into Day 2 (22 April) perhaps reaching elevated levels for a spell, although this aspect carries low confidence, and a slower regime could equally persist throughout. The onset of a Strong Geomagnetic Storm is considered Likely early on Day 3 (Monday 24 April) from the 21/1812UTC flare and filament. Minor to Moderate geomagnetic storm is Expected. Activity then waning into Day 4 (25 April).

Energetic Particles / Solar Radiation: No solar radiation storms have been observed so far however some increase in activity is noted following the Moderate class flare on 21 April and there is a slight chance of S1 or greater. This is however more likely to be due to the largest sunspot region.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	30	80	30
Strong	G3	No	1	20	50	10
Severe	G4	No	1	1	10	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	20	20	30	30
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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